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January 29, 2018

Delta Independent Science Board
980 Ninth Street, Suite 1500
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Sent via e-mail: disb@deltacouncil.ca.gov

Subject: Water Quality Science in the Sacramento-San Joaquin Delta, December 12, 2017 Part I: Chemical Contaminants and Nutrients

Dear Members of the Delta Independent Science Board:

Regional San is pleased to submit comments on the Delta Independent Science Board's (Delta ISB) draft thematic review report on Water Quality Science in the Sacramento-San Joaquin Delta Part I: Chemical Contaminants and Nutrients (WQ Review). Regional San provides wastewater collection, conveyance and treatment for over 1.4 million people in the Sacramento region. On average, we safely treat and discharge 140 million gallons per day (mgd) of wastewater in accordance with our National Pollutant Discharge Elimination System permit. In addition to our own compliance monitoring, we are an active member of the ongoing Delta Regional Monitoring Program (Delta RMP) and in the past have led efforts on the Sacramento and American Rivers to perform a Coordinated Monitoring Program (CMP, 1991-2007). Regional San is also highly involved in multiple other stakeholder venues (e.g. Delta Nutrient Research Plan, CV-SALTS, etc.) regarding the understanding and interpretation of Delta science pertaining to water quality and ecosystem health. Regional San supports the use of sound science and joint fact finding in making important management and policy decisions to protect the Delta ecosystem.

We value the Delta ISB's review and recommendations on Delta scientific issues and, in this case, on the Delta-specific water quality thematic review. Overall, the ISB review considered many important water quality issues in the Delta, but, in some instances, seems to adopt a position held by one segment of the stakeholder community, but that may not be shared by other stakeholders. In these cases, the review lacks the detailed analysis necessary to fully explain the conclusions drawn regarding effects of particular contaminants in the system.

The first finding in the review recognizes that "there is little that is simple, and much that can be misconstrued, in the description and interpretation of water quality in the Delta." It may have been the intent of the document to summarize Delta water quality concepts as they relate to the questionnaire, comments, and interviews, but additional information is needed in the review to describe the multiple facets of some issues and provide greater focus to explain the authors' conclusions. General statements describing the need for additional water quality research (and funding) are welcome and could be improved with more direct recommendations on how this can be achieved (e.g., funding sources and mechanisms to support the Delta RMP). Programs generally prioritize their monitoring and water quality studies to fit within their available budgets. There may be approaches to refine or streamline some water quality data collection procedures, but more funding will generally be needed to collect more data. The following detailed comments provide our recommended edits to improve the Delta ISB's draft WQ Review.

1. According to the list in appendix B, most respondents to the water quality survey were state, federal and water agency personnel, without much input from the regulated community or academia. Were the survey responses from all interviewed organizations included in appendix B? Regional San and the Delta Regional Monitoring Program do not appear to be included in the list of participating organizations, in spite of staff having participated in interviews with ISB members. It is also important for this report to receive input from multiple staff at the Central Valley Regional Water Quality Control Board, beyond their Irrigated Lands Section. We believe that further survey input from additional Delta stakeholders and researchers would present a more balanced perspective on the understanding of water quality issues in the Delta.

2. The gap between the current perception of water quality stressors in the Delta and the actual current scientific knowledge on the subject needs to be given greater emphasis in this WQ Review. Selected survey comments from specific stakeholders are quoted throughout the main body of the review, which makes them appear to be used as supporting statements for the Delta ISB's scientific evaluation of the topics. It is unclear if these quoted comments are featured because the Delta ISB agrees with the statements or because they provide an interesting example of how a particular stakeholder views the subject. This should be clarified.

3. We support the first recommendation that "A more comprehensive view of the multiple elements that comprise water quality in the Delta is needed among stakeholders." (Page 3). To aid this goal, it is important for the water quality review to discuss how individual stressors do not exist in isolation and that other regulating factors must be considered when they are known to affect specific processes or to cause adverse effects in the Delta. For example:

    a. Flow is a significant factor affecting the occurrence of cyanobacteria and harmful algae blooms (HABs). Lehman et al. (2000, 2008) found flow characteristics (residence time) and water temperature to be more important than nutrients to HABs, and therefore it is an important consideration for managers and water quality scientists in understanding HABs, yet it is not mentioned along other drivers in this report. The report only generally recognizes that flow alteration is a stressor (Section III.A) but does not mention it among the factors affecting HABs in the specific discussion of this topic. Water flow will also be an important factor for the future Delta ISB water quality review on salinity, temperature and dissolved oxygen.
    b. References to other important contributing factors should be restated in discussions of specific stressors. For example, "Nutrient distributions, in addition to flow and temperature, also likely influence HABs and invasive aquatic vegetation." (Page 12). This should be reiterated on page 21 where *Microcystis* is discussed again under algal toxins.
    c. While sufficient nitrogen and phosphorus are necessary to support phytoplankton growth, nutrients might not be the "major factors regulating the growth of algae and aquatic plants" (page 10, line 5). As described on page 12-13 in this review, a holistic analysis is needed to determine how the multiple drivers can interact to regulate phytoplankton and macrophyte growth, including flow rates and residence time, temperature, water clarity, water depth, grazer biomass, source populations (for recruitment), and the chemical compositions of the water (including nutrient and contaminant concentrations). We suggest that you revise the text on (page 10, line 5) to read "… and total phosphorus [TP] that ~~are major~~ **<u>can be among the important</u>** factors regulating the growth of algae and other aquatic plants".
    d. Invasive species are briefly mentioned in the discussion of nutrients, but their importance is lost when the discussion focuses on nutrient concentrations and forms (pages 12-13). The relative significance of invasive species, among other factors affecting primary production in the Delta, should be discussed if known, or stated to be uncertain if not. This will help avoid the omission of important covariates in Delta research, data collection, and discussions, with the goal of focusing efforts on a holistic understanding of the factors that have greatest potential for affecting water quality improvements.

4. This WQ Review has a significant and concerning statement that "*It is not clear to us, or to many of the agency personnel whom we contacted, how water quality data are being used in management decisions, and whether the data being collected are sufficient to support management decisions and policies*." (Page 1). It would be helpful to know the extent that managers who make decisions affecting water quality (e.g. Central Valley Water Board staff) were surveyed by the Delta ISB for this review. If Delta water managers were surveyed, then this statement is indeed very concerning and the Delta ISB may want to emphasize the need for more collaborative decision making that incorporates water quality data to inform water management decisions, or to discuss how regulatory requirements or other factors are currently preventing the use of water quality data. At a minimum, it would be helpful to explain why and in what forums water quality data are not being used to inform water management decisions and policies in the Delta. It is also important to acknowledge that a large amount of water quality data is currently collected and analyzed to develop water quality regulations and demonstrate permit compliance. Water quality regulations, such as National Pollutant Discharge Elimination System (NPDES) permits, 303(d) listings, TMDLs, and the Sacramento/San Joaquin Basin Plan rely on a strong scientific understanding of existing water quality data and analyses as the basis for management decisions.

5. The discussion on nutrients describes Regional San's contribution to the annual ammonium load in the Sacramento River (page 10). It should be explained that over time most of this ammonium load is converted into nitrate by nitrifying bacteria. The review should also acknowledge that the Central Valley Water Board is currently developing the Delta Nutrient Research Plan, with stakeholder input, to study and understand how nitrogen and phosphorus concentrations influence water quality and ecosystem health in the Delta, and whether nutrient load management would solve identified problems.

6. On the list of variables potentially affecting water quality and ecological processes on Page 6 (Line 41), you should consider adding additional important drivers, such as temperature, salinity, water flow, and water depth. Other biological components can include the biomass of organisms which consume phytoplankton (i.e. clams), the prevalence of recruitment or seeding from other water sources, and the continuous interactions with microbes and benthic algae layers that are present in the habitat.

7. It is not clear what is meant by "…even though science is increasingly telling us that 'sublethal' exposures to contaminants can profoundly affect fitness, and consequently survival and reproduction of many species (e.g., Fong et al. 2016), there is no comprehensive program that monitors and assesses contaminants in the Delta." (page 6). This statement neglects the Delta Regional Monitoring Program, the State Water Resources Control Board's Stream Pollution Trends Monitoring Program (SPOT), and water quality compliance monitoring programs such as the Department of Water Resources' Municipal Water Quality Investigations. These programs may not have comprehensive spatial coverage, or test for the presence of sublethal contaminants, but it is worth acknowledging that they regularly monitor several types of contaminants.

8. The report broadly summarizes some of the current water quality science and recognizes data gaps. However, there is a striking conclusion of beneficial use impairment from pesticides. "…pesticides are having deleterious effects on the health of individual organisms in the Delta…" (page 14). This WQ Review should reference existing 303(d) listings that support this statement (e.g., Sacramento-San Joaquin River Delta Region impairment listings for Chlordane, DDT, Dieldrin, Chlorpyrifos, Diazinon, Group A Pesticides) and existing TMDLs. This definitive statement should also be supported by references from the primary literature describing the known deleterious effects of specific contaminants and the spatial and temporal extent of their occurrence within the Delta. References cited in the pesticide discussion are not Delta specific (Laetz et al. 2009, 2015), describe exposure but not effects (Orlando et al. 2013), or refer to correlations (but not causation) and indirect lines of evidence linking pesticides with aquatic organism population effects (Fong et al. 2016), which have not been well vetted in the Delta science community.

9. It should be noted that Delta invertebrates (e.g. *Hyalella azteca*) are known to develop pesticide resistance and inhabit regions of the Delta watershed that experience frequent pesticide exposure.

10. Delta interactions between species, habitat, water quality, and various contaminants are complex, as recognized by Fong et al. (2016), and the ISB should be cautious about the weight behind any single-variable correlation (page 13). Specifically, the report quotes Fong et al. (2016) as showing "significant correlations between pyrethroid use and declining abundance of POD fish species" as support for a statement that "...studies in other systems have shown that these types of [sublethal] effects can scale up to have impacts on fish populations (Baldwin et al. 2009)." However, any variable that changed monotonically within the Delta over the past 20 years, including the use of pyrethroid pesticides, would be likely to show a correlation with the decline in some native fish populations. For example, a study presented at the 2017 IEP Annual Workshop found that declines in Delta Smelt abundance were correlated with increasing thermal stress. In contrast, declines in the abundance of Longfin Smelt (which migrate to the ocean) be correlated with a decreasing trend in freshwater outflow. (Hobbs. J., L. Lewis, M. Wilmes. 2017. *Demise of the Delta's smelts: Impact of drought and climate change on the unlikely survival of endangered smelt in a highly-altered ecosystem.* Interagency Ecological Program Annual Workshop. Poster session. While this study was just at the "poster" stage, we noticed that quite a few of the mercury-related references in the WQ Review were references to presentation made at the Bay-Delta Science Conference in 2016, so it seems that the Delta ISB is taking into account emerging Delta science, even if peer-review papers are as yet lacking.) Because of the potential for multiple variables to correlate with changes in species abundance, it is extremely important to understand the temporal and spatial extent of contaminant exposure in the Delta and determine the biological responses of local organisms to environmentally relevant chemical concentrations. This WQ Review should reference the existing 303d and TMDL listings for pyrethroid pesticides in the Delta as the basis for any statements regarding the need to reduce pesticide application and transport to surface waters, rather than focusing on a correlation analysis paired with an assumption of indirect effects.

11. The discussion of data/knowledge gaps in the mercury section (pages 16-17) is very helpful and a similar discussion should be included in each of the other contaminant discussions.

12. The selenium discussion could be improved by making several minor edits to its format and content as suggested below:

    a. The introductory paragraph discussing selenium should clarify that the most sensitive reproductive effects described pertain to fish and birds (page 17).
    b. It might be helpful to mention, in the discussion of data/knowledge gaps in the mercury section, that selenium can be protective of organisms (Ralston and Raymond 2010) when it has a role in counter-acting the developmentally harmful effects of mercury (page 17).
    c. Consider including a reference and description of the USEPA's draft water quality criteria for selenium (USEPA 2016) in the Bay and Delta where discussing the TMDL (page 18).
    d. Clams can contain high concentrations of selenium in the Delta, which can be passed on through the diet to sturgeon.
    e. In the selenium discussion on page 18, deleting lines 18-23 would avoid repeating information in the following paragraph and identifying the activities of one specific consultant without reviewing the activities of others.
    f. The North Bay TMDL is also discussed unnecessarily in two separate paragraphs (lines 1 and 29).

13. As recommended in Finding #8, collecting water quality measurements at frequencies commensurate with the variability of the contaminants would help to fully understand the patterns of contaminant occurrence and concentration, but it is currently economically and logistically unfeasible to perform this level of sampling throughout the Delta. Numerous amounts of trace chemical contaminants could

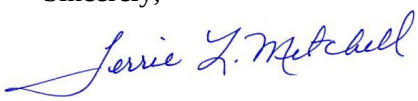
occur throughout the Delta and would potentially vary on a daily or hourly basis. It is currently very expensive to collect and identify a broad suite of chemical contaminants, although this field of research is constantly improving. During some water conditions when contaminant loading could increase, such as high-water conditions during winter storms, it can also be very unsafe to access some sampling locations. We agree with the recommendation that increased spatial and temporal sampling, particularly during key events, would improve our understanding of variability on loading, but sampling likely will need to occur at a lower frequency than the predicted environmental variability.

14. It is important to note that the white paper on CyanoHABs (Berg and Sutula 2015) described on Page 21 (Line 28) was developed by SCCWRP with funding and guidance from the Central Valley Regional Water Quality Control Board and with extensive input from numerous Delta stakeholder organizations.

15. The inclusion of Section IV. "Key points from the Delta ISB Questionnaire" on Page 22 (line 18) needs further discussion in its introduction to explain why the section was developed, how the key ideas were selected, and what the intended purpose and goals were for including these selected quotations. Was this section included to compare the diversity of perspectives from survey respondents regarding water quality science in the Delta, or does this section identify particular ideas and quotations with which the Delta ISB concurs and would like to feature as an additional set of recommendations in the review? The quotations provided in Section IV should also be provided in Appendix B, along with comments from other survey respondents not included in the grouping of key ideas, to provide a more balanced presentation of the input received.

We look forward to working with the Delta ISB in evaluating and reviewing water quality science in the Delta, with the overall goal of encouraging better informed management and policy decisions. Regional San appreciates the opportunity to comment on the Delta ISB's draft WQ Review. If you have any questions, please contact me at (916) 876-6092 or mitchellt@sacsewer.com or Sam Safi at (916) 876-6290 or safis@sacsewer.com.

Sincerely,



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cc: Christoph Dobson, Director of Policy and Planning
Lisa Thompson, Chief Scientist
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References:

Lehman, P. W., 2000. The influence of climate on phytoplankton community carbon in San Francisco Bay Estuary. Limnology and Oceanography 45: 580–590.

Lehman PW, G. Boyer, M. Stachwell, S. Waller. 2008. The influence of environmental conditions on the seasonal variation of Microcystis cell density and microcystins concentration in San Fransisco Estuary. Hydrobiologia 600:187-204.

Ralston, N.V. and L.J. Raymond. 2010. Dietary selenium's protective effects against methylmercury toxicity. Toxicology. 278(1):112-23. doi: 10.1016/j.tox.2010.06.004

USEPA. 2016. Proposed Aquatic Life and Aquatic-Dependent Wildlife Criteria for Selenium in California's San Francisco Bay and Delta. Office of Water. 820-F-16-006